

1

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3

4

A

A

B

B

C

C

D

D

Description.SchDoc



PowerDistribution.SchDoc



MicroController.SchDoc



GateDriverandMosfets.SchDoc




Measuring.SchDoc



Control.SchDoc



Title: <i>Main</i>			Mergen Elektronik		
Size: A4	Number: 20240101	Revision: v0.0.1	Türkiye		
Date: 10.10.2024	Time: 22:38:14	Sheet 1 of 7	*	*	Drawn By : Ekrem T. Firat
Project Mergen SMPS Board.PrjPcb			*		

1

2

3

4

Mergen Switch Mode Power Supply Board

Attention: This project is open source and still under development. The project is always dangerous because it involves grid electricity's transformation and control. The engineer is not responsible for any adverse situation that may occur.
Contact: ig:mergenelk

Project Purpose

This project aims to use 220VAC in 0-30V direct current with transformer and converter circuits.

Power Distribution

The scheme aims to filter 50VAC from an externally connected transformer and convert it into Direct Current to provide the necessary voltage to the components and the system.

MicroController

In this scheme, it is aimed to produce PWM, make the necessary measurements, reflect it on the screen and provide the output.

Gate Driver and MOSFETS

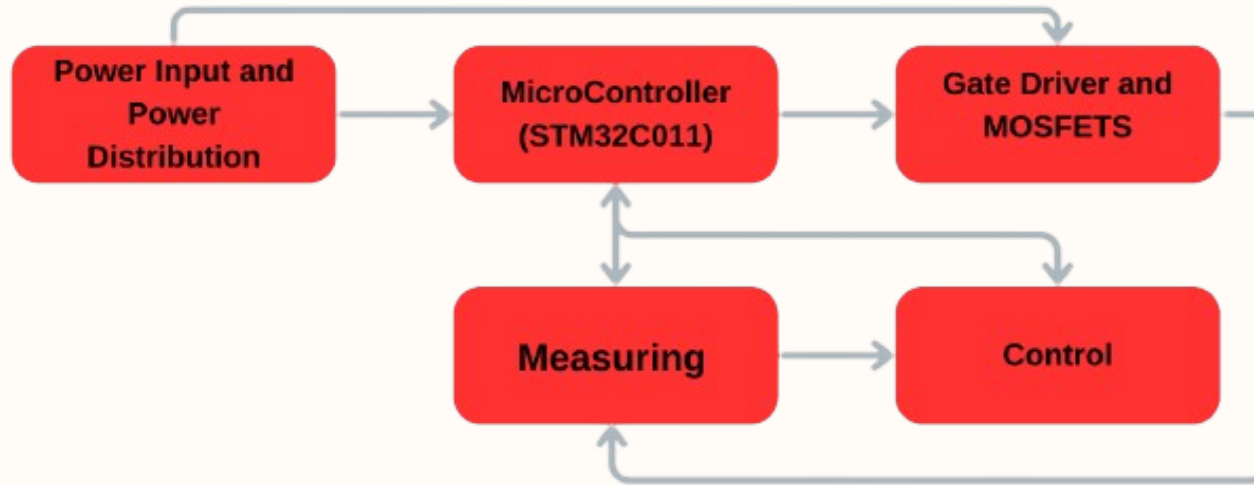
This scheme is intended to control the MOSFETs and filter the power output.

Measuring

This scheme is intended to measure the output current and voltage and ensure that the current limit is not exceeded.

Measuring

This diagram is intended to set the desired output voltage and current limit.



Port Colors

VAC Input —
Relay —
Control —
LCD —
Gates I/O —
Measuring —

Some port colors are left as default.

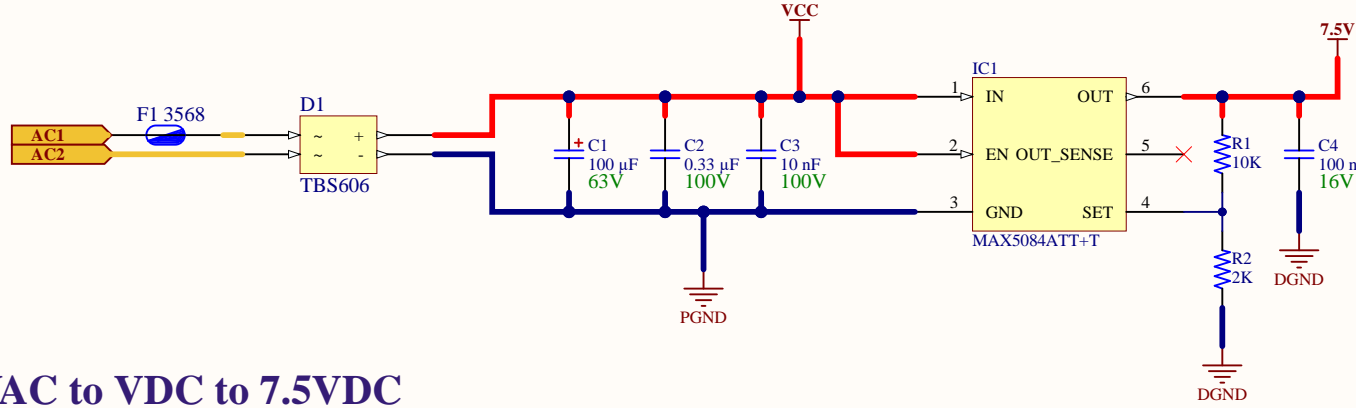
GND, VCC, 7.5V, 3.3V lines are specially used as thick and colored.

Resources

- 1) Basic Calculation of a Buck Converter's Power Stage, August 2015, SLVA447B - Texas Instruments
 - 2) Understanding Buck Power Stages in Switchmodes Power Supplies, March 1999, SLVA057 - Texas Instruments
 - 3) STM32C011 Datasheet, January 2024, STM32C011x4/x6 - STMicroelectronics
 - 4) UCC27282 Datasheet, May 2022, UCC27282 - Texas Instruments
 - 5) Best of Power Tips, SSZTCY0 - Texas Instruments
 - 6) and component datasheets :)
- Thank you to everyone who provided their information and opinions.

Title: Description			Mergen Elektronik		MERGEN
Size: A4	Number: 20240101	Revision: v0.0.1	Türkiye	*	
Date: 10.10.2024	Time: 22:38:14	Sheet 2 of 7	*	*	Drawn By : Ekrem T. Fırat
Project Mergen SMPS Board.PrjPcb					

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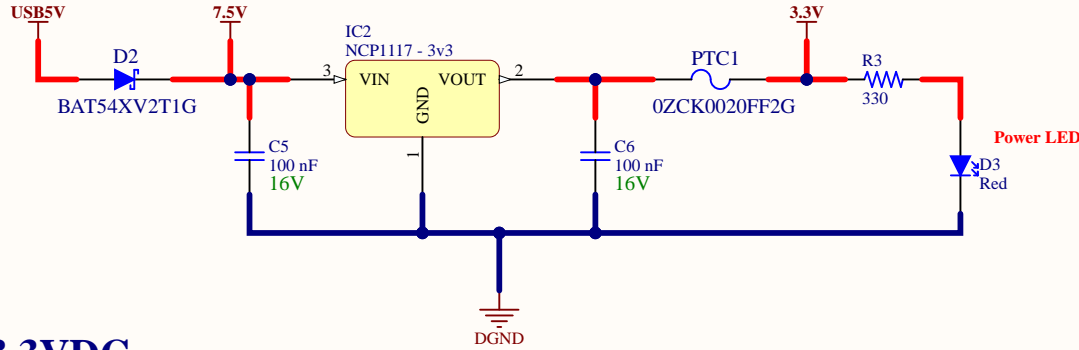
VAC to VDC to 7.5VDC

TBS606 Bridge Rectifier;

600V 6A,
Bridge Rectifier Input 36VAC,
Bridge Rectifier Out = $36 \times \sqrt{2}$
VCC = 50VDC $\pm 1V$
VAC Tepe Değer Formülünden

MAX5084 Lin. Voltage Reg.;

VIN: 4-60V, IOU=200mA,
VOUT: 2.54-11V,
 $R1 = R2 \times \{(VOUT/1.25) - 1\}$
VOUT= 7.5V due to Gate Driver



7.5VDC to 3.3VDC

NCP1117 Lin. Voltage Reg.;

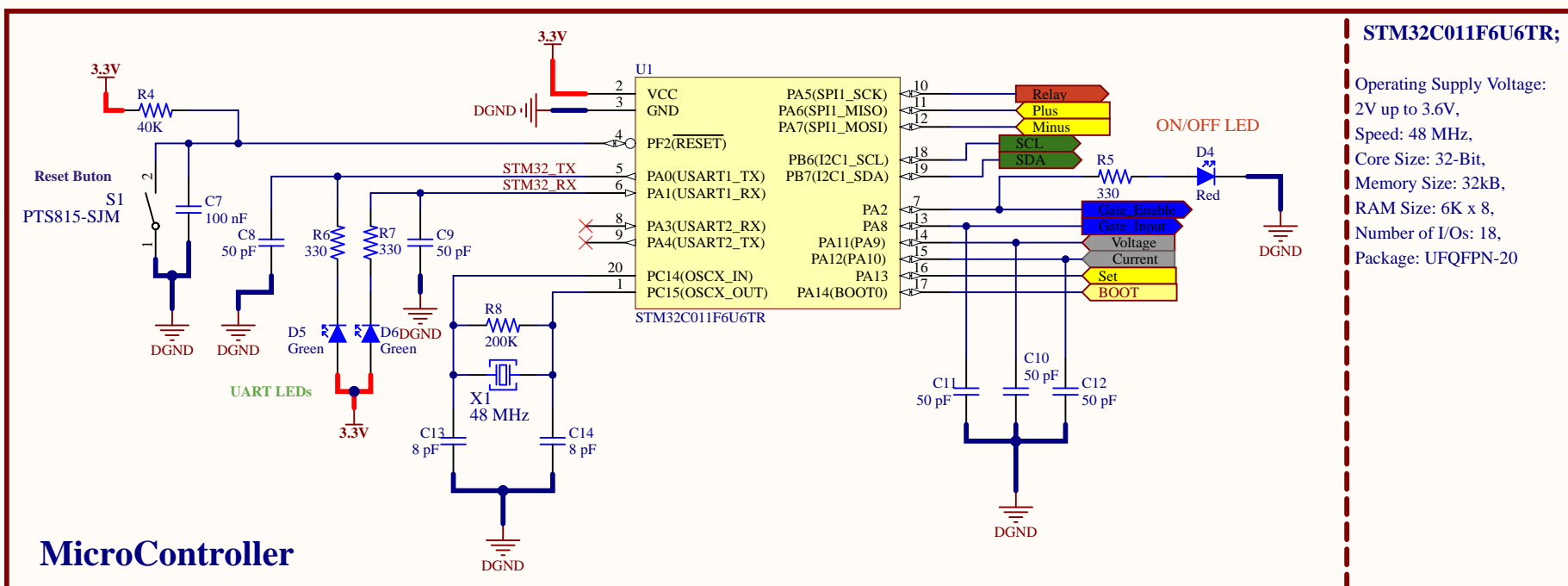
VIN: 4-60V, IOU = 1A,
VOUT = 3.3V

BAT54XV2T1G Schottky Diyot;
100V, 200mA

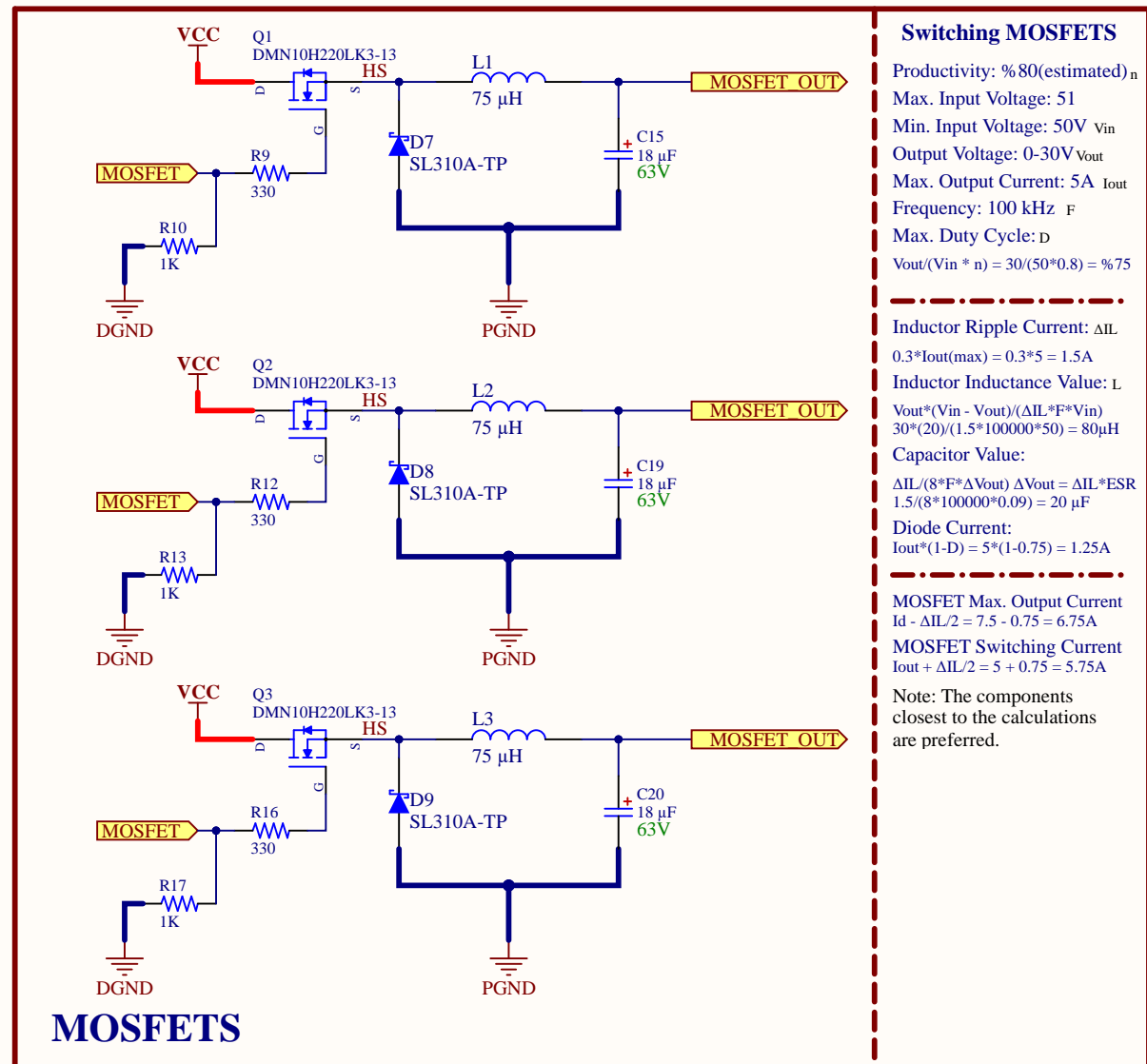
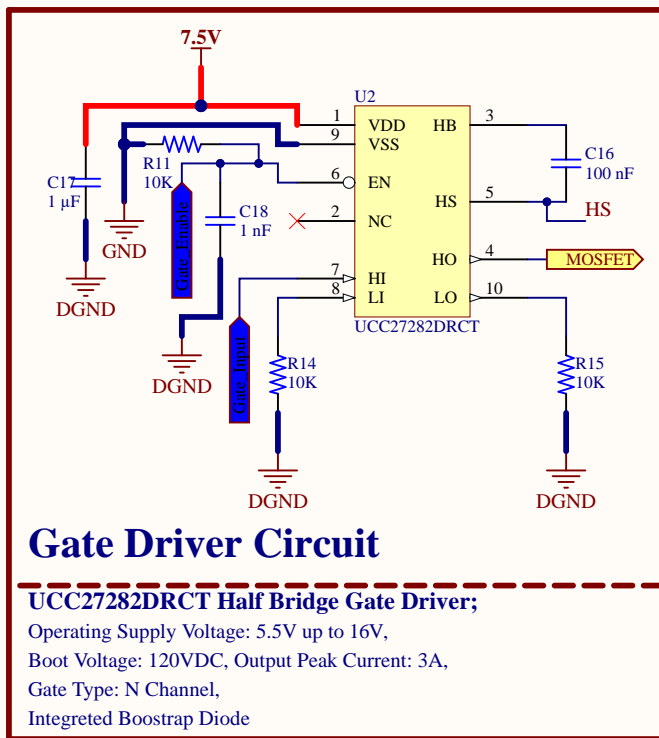
0ZCK0020FF2G PTC;
Trip Current = 500 mA
Voltage Rated = 9V

Title: Power Distribution			Mergen Elektronik		MERGEN
Size: A4	Number: 20240101	Revision: v0.0.1	Türkiye	*	
Date: 10.10.2024	Time: 22:38:15	Sheet3 of 7	*	*	Drawn By: Ekrem T. Fırat
Project Mergen SMPS Board.PrjPcb					


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Contact: ig:mergenelk



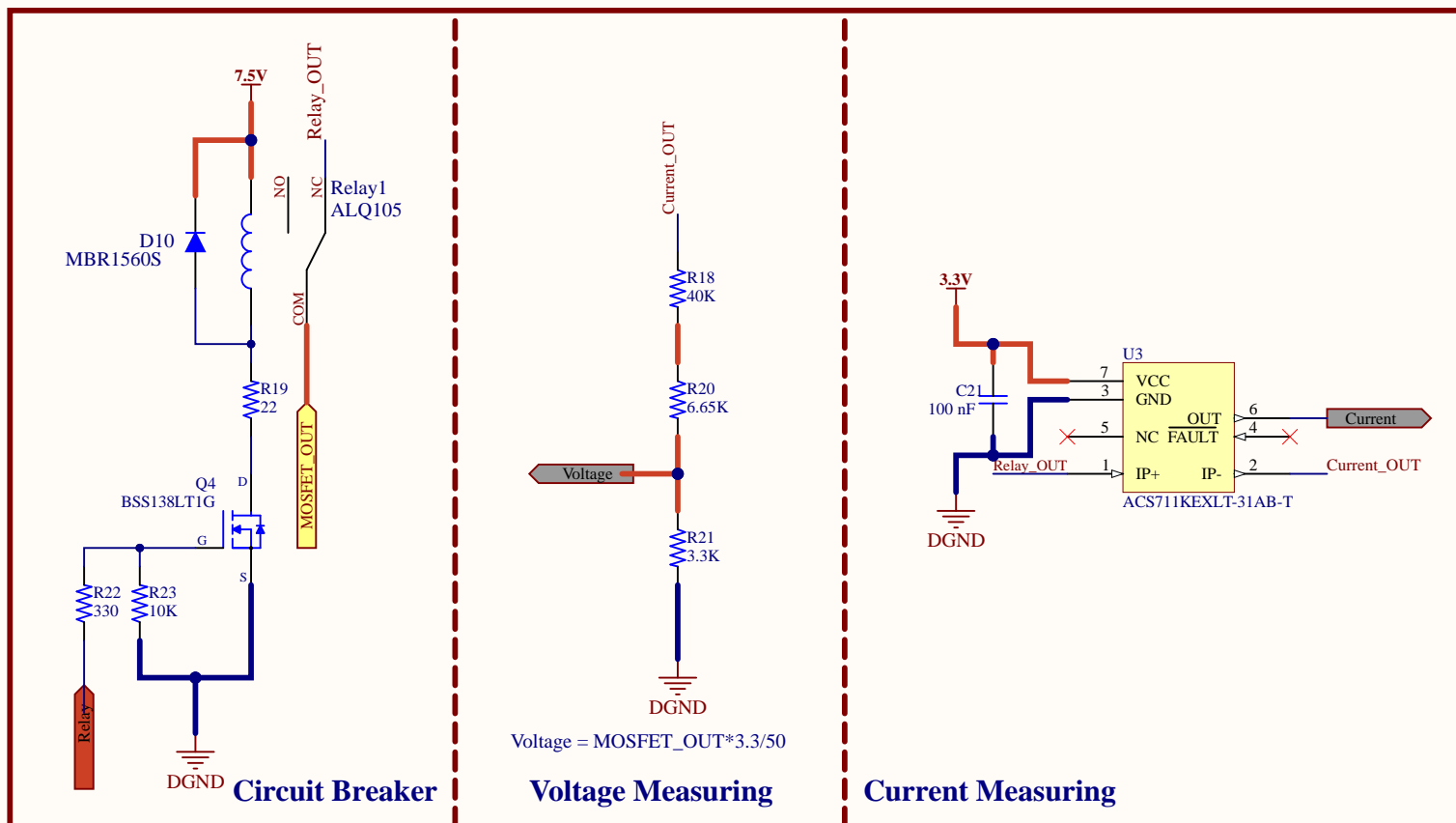
Title: MicroController			Mergen Elektronik		
Size: A4	Number: 20240101	Revision: v0.0.1	Türkiye	*	
Date: 10.10.2024	Time: 22:38:15	Sheet4 of 7	*	*	Drawn By : Ekrem T. Fırat
Project Mergen SMPS Board.PrjPcb					




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 Contact: ig:mergenelk

Title: <i>Gate Driver and MOSFETs</i>			Mergen Elektronik		
Size: A4	Number: 20240101	Revision: v0.0.1	Türkiye		
Date: 10.10.2024	Time: 22:38:15	Sheet5 of 7	*	*	Drawn By : Ekrem T. Fırat
Project Mergen SMPS Board.PrjPcb			*		

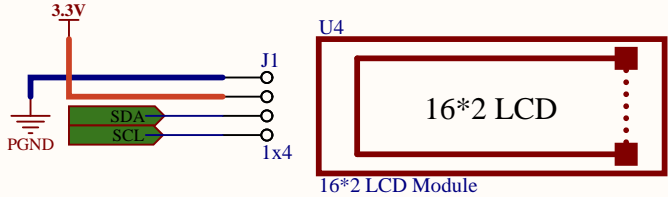
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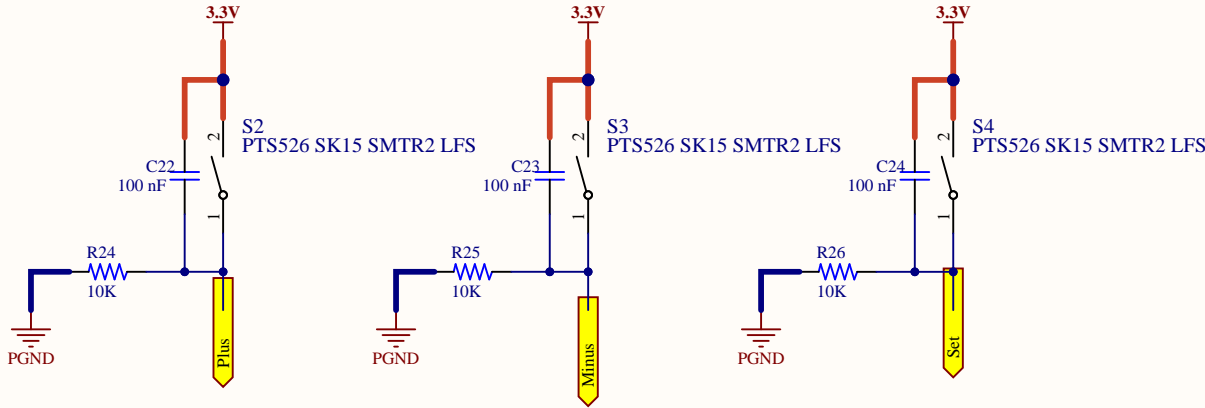
Title: Measuring			Mergen Elektronik	
Size: A4	Number: 20240101	Revision: v0.0.1	Türkiye	
Date: 10.10.2024	Time: 22:38:15	Sheet6 of 7	* *	Drawn By : Ekrem T. Fırat
Project Mergen SMPS Board.PrjPcb			*	

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Contact: ig:mergenelk

Control Screens



Control Buttons



Title: Control			Mergen Elektronik		MERGEN
Size: A4	Number: 20240101	Revision: v0.0.1	Türkiye	*	
Date: 10.10.2024	Time: 22:38:15	Sheet 7 of 7	*	*	Drawn By: Ekrem T. Fırat
Project Mergen SMPS Board.PrjPcb					

Comment	Description	Designator	Footprint	RefDes	Quantity
100 µF	Mergen Elektronik Capacitors - Aluminum Electrolytics - SMDs - 100µF 105MM105	C1	MergenElektronik_Capacitors_AluminumElectrolytics_SMDs_100µF105MM105	MergenElektronik_Capacitors_AluminumElectrolytics_SMDs_100µF105MM105	1
0.33 µF	Mergen Elektronik Capacitors - Ceramics SMDs - 1206 - 0.33 µF 105V	C2	MergenElektronik_Capacitors_Ceramics_SMDs_1206_0.33µF_105V	MergenElektronik_Capacitors_Ceramic_SMDs_0.33µF_100V	1
10 nF	Mergen Elektronik Capacitors - Ceramics SMDs - 0603 - 10 nF - 105V	C3	MergenElektronik_Capacitors_Ceramics_SMDs_0603_0.1µF_105V	MergenElektronik_Capacitors_Ceramic_SMDs_10nF_100V	1
100 nF	Mergen Elektronik Capacitors - Ceramics SMDs - 0603 - 100 nF - 10V Mergen Elektronik Capacitors - Ceramics SMDs - 0603 - 100 nF - 105V	C4, C5, C6, C7, C16, C21, C22, C23, C24	MergenElektronik_Capacitors_Ceramics_SMDs_0603_0.1µF_105V	MergenElektronik_Capacitors_Ceramic_SMDs_100nF_10V MergenElektronik_Capacitors_Ceramic_SMDs_100nF_100V	9
50 pF	Mergen Elektronik Capacitors - Ceramics SMDs - 0603 - 50 pF - 50V	C8, C9, C10, C11, C12	MergenElektronik_Capacitors_Ceramics_SMDs_0602_0.1µF_50V	MergenElektronik_Capacitors_Ceramic_SMDs_50pF_50V	8
8 pF	Mergen Elektronik Capacitors - Ceramics SMDs - 0603 - 8 pF - 50V	C13, C14	MergenElektronik_Capacitors_Ceramics_SMDs_0603_0.1µF_50V	MergenElektronik_Capacitors_Ceramic_SMDs_8pF_50V	2
18 µF	Mergen Elektronik Capacitors - Aluminum Electrolytics - THFs - 6350E18M	C15, C19, C20	MergenElektronik_Capacitors_AluminumElectrolytics_THFs_6350E18M	MergenElektronik_Capacitors_AluminumElectrolytics_THFs_6350E18M	3
1 µF	Mergen Elektronik Capacitors - Ceramics SMDs - 1206 - 1 µF - 105V	C17	MergenElektronik_Capacitors_Ceramics_SMDs_1206_0.1µF_105V	MergenElektronik_Capacitors_Ceramic_SMDs_1µF_100V	1
1 nF	Mergen Elektronik Capacitors - Ceramics SMDs - 0402 - 1 nF - 50V	C18	MergenElektronik_Capacitors_Ceramics_SMDs_0402_0.1µF_50V	MergenElektronik_Capacitors_Ceramic_SMDs_1nF_50V	1
TB506	Mergen Elektronik Diodes - Bridge Rectifiers - TB506	D1	MergenElektronik_Diodes_BridgeRectifiers_TB506	MergenElektronik_Diodes_BridgeRectifiers_TB506	1
BAT54XV21G	Mergen Elektronik Diodes - Schottky Diodes - BAT54XV21G	D2	MergenElektronik_Diodes_SchottkyDiodes_BAT54XV21G	MergenElektronik_Diodes_SchottkyDiodes_BAT54XV21G	1
Red	Mergen Elektronik LEDs - SMDs - Red - 0603	D3, D4	MergenElektronik_LEDs_SMDs_0603_0.1µF_50V	MergenElektronik_LEDs_SMDs_Red_0603	2
Green	Mergen Elektronik LEDs - SMDs - Green - 0603	D5, D6	MergenElektronik_LEDs_SMDs_0603_0.1µF_50V	MergenElektronik_LEDs_SMDs_Green_0603	2
SL110A-TP	Mergen Elektronik Diodes - Schottky Diodes - SL110A-TP	D7, D8, D9	MergenElektronik_Diodes_SchottkyDiodes_SL110A-TP	MergenElektronik_Diodes_SchottkyDiodes_SL110A-TP	3
MBR1560S	Mergen Elektronik Diodes - Single Diodes - MBR1560S	D10	MergenElektronik_Diodes_SingleDiodes_MBR1560S	MergenElektronik_Diodes_SingleDiodes_MBR1560S	1
3568	Mergen Elektronik Fuse Holder - Blade Type - 3568	F1	MergenElektronik_FuseHolders_BladeType_3568	MergenElektronik_FuseHolders_BladeType_3568	1
MAX9844T1-T	Mergen Elektronik Regulators - Linear - MAX9844T1-T	IC1	MergenElektronik_Regulators_Linear_MAX9844T1-T	MergenElektronik_Regulators_Linear_MAX9844T1-T	1
NCPI117-3x3	Mergen Elektronik Regulators - Linear - NCPI117-3x3	IC2	MergenElektronik_Regulators_Linear_NCPI117-3x3	MergenElektronik_Regulators_Linear_NCPI117-3x3	1
7x4	Mergen Elektronik Connectors - Headers Tail Male	J1	MergenElektronik_Connectors_Headers_7x4_Male	MergenElektronik_Connectors_Headers_7x4_Male	1
75 µH	Mergen Elektronik Inductors - Power Inductors - SMDs - Inductors - 75 µH - 1.2A	L1, L2, L3	MergenElektronik_Inductors_PowerInductors_SMDs_Inductors_75µH_1.2A	MergenElektronik_Inductors_PowerInductors_SMDs_ASP_80405	3
020X020F2G	Mergen Elektronik Circuit Protection - PTCs - 020X020F2G	PTC1	MergenElektronik_CircuitProtection_PTCs_020X020F2G	MergenElektronik_CircuitProtection_PTCs_020X020F2G	1
DAW104D220K13-13	Mergen Elektronik Transistors - Mosfets - DAW104D220K13-13	Q1, Q2, Q3	MergenElektronik_Transistors_Mosfets_DAW104D220K13-13	MergenElektronik_Transistors_Mosfets_DAW104D220K13-13	3
B53138LT1G	Mergen Elektronik Transistors - Mosfets - B53138LT1G	Q4	MergenElektronik_Transistors_Mosfets_B53138LT1G	MergenElektronik_Transistors_Mosfets_B53138LT1G	1
10K	Mergen Elektronik Resistors - Chip Resistors - 0603 - 10K	R1, R11, R14, R15, R21, R24, R25, R26	MergenElektronik_Resistors_ChipResistors_0603_0.1µF_50V	MergenElektronik_Resistors_ChipResistors_0603_10K	8
2K	Mergen Elektronik Resistors - Chip Resistors - 0603 - 2K	R2	MergenElektronik_Resistors_ChipResistors_0603_0.1µF_50V	MergenElektronik_Resistors_ChipResistors_0603_2K	1
330	Mergen Elektronik Resistors - Chip Resistors - 0603 - 330	R3, R5, R6, R7, R9, R12, R16, R22	MergenElektronik_Resistors_ChipResistors_0603_0.1µF_50V	MergenElektronik_Resistors_ChipResistors_0603_330	8
40K	Mergen Elektronik Resistors - Chip Resistors - 0603 - 40K	R4, R18	MergenElektronik_Resistors_ChipResistors_0603_0.1µF_50V	MergenElektronik_Resistors_ChipResistors_0603_40K	2
200K	Mergen Elektronik Resistors - Chip Resistors - 0603 - 200K	R8	MergenElektronik_Resistors_ChipResistors_0603_0.1µF_50V	MergenElektronik_Resistors_ChipResistors_0603_200K	1
1K	Mergen Elektronik Resistors - Chip Resistors - 0603 - 1K	R10, R11, R17	MergenElektronik_Resistors_ChipResistors_0603_0.1µF_50V	MergenElektronik_Resistors_ChipResistors_0603_1K	3
22	Mergen Elektronik Resistors - Chip Resistors - 0603 - 22	R19	MergenElektronik_Resistors_ChipResistors_0603_0.1µF_50V	MergenElektronik_Resistors_ChipResistors_0603_22	1
6.69K	Mergen Elektronik Resistors - Chip Resistors - 0603 - 6.69K	R20	MergenElektronik_Resistors_ChipResistors_0603_0.1µF_50V	MergenElektronik_Resistors_ChipResistors_0603_6.69K	1
3.3K	Mergen Elektronik Resistors - Chip Resistors - 0603 - 3.3K	R21	MergenElektronik_Resistors_ChipResistors_0603_0.1µF_50V	MergenElektronik_Resistors_ChipResistors_0603_3.3K	1
ALQ105	Mergen Elektronik Relays - Power Relay - ALQ105	Relay1	MergenElektronik_Relays_PowerRelay_ALQ105	MergenElektronik_Relays_PowerRelay_ALQ105	1
PT5815-SM	Mergen Elektronik Switches - Tactile Switches	S1	MergenElektronik_Switches_TactileSwitches_PT5815	MergenElektronik_Switches_TactileSwitches_PT5815-SM	1
PT5326-SK15-SMT121FS	Mergen Elektronik Switches - Tactile Switches - PT5326-SK15-SMT121FS	S2, S3, S4	MergenElektronik_Switches_TactileSwitches_PT5326	MergenElektronik_Switches_TactileSwitches_PT5326-SK15-SMT121FS	3
STM32C011F4U61R	Mergen Elektronik Microcontrollers - STM32C011F4U61R	U1	MergenElektronik_Microcontrollers_STMicroelectronics_STM32C011F4U61R	MergenElektronik_Microcontrollers_STMicroelectronics_STM32C011F4U61R	1
UC2728208CT	Mergen Elektronik Logic - Gate Drivers - UC2728208CT	U2	MergenElektronik_Logic_GateDrivers_UC2728208CT	MergenElektronik_Logic_GateDrivers_UC2728208CT	1
ACS711HELT-31A8-T	Mergen Elektronik Sensors - Current Sensors - ACS711HELT-31A8-T	U3	MergenElektronik_Sensors_CurrentSensors_ACS711HELT-31A8-T	MergenElektronik_Sensors_CurrentSensors_ACS711HELT-31A8-T	1
16"2 LCD Module	Mergen Elektronik Screens - LCDs - 16x2 Module	U4	MergenElektronik_Screens_LCDs_16x2Module	MergenElektronik_Screens_LCDs_16x2Module	1
48 MHz	Mergen Elektronik Oscillators - Crystals - 0.9M0 - 48 MHz	X1	MergenElektronik_Oscillators_Crystals_0.9M0	MergenElektronik_Oscillators_Crystals_2.5M0_48MHz	1